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ABSTRACT

Literature on four methods to effectively use the telephone to reinforce two-way communication in instruction is comprehensively reviewed. A study conducted in Sweden using teleteaching, telelecturing, dial-access, and teletutoring is briefly discussed. A bibliography of 93 items is included. (DS)

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THE TELEPHONE AS AN INSTRUCTIONAL AID IN DISTANCE EDUCATION

A SURVEY OF THE LITERATURE

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RUNE FLINCK

IR 002 656

Project: Two-way communication in correspondence education

TWO-WAY COMMUNICATION IN CORRESPONDENCE EDUCATION

AIM

The aim of the project is to study the importance of two-way communication in correspondence education. The research work is focused on different modes of two-way communication. Three experimental series are carried out:

1 Assignment for submission in correspondence education

2 Correspondence education combined with systematic telephone instruction

3 Correspondence education combined with group meetings.

SOURCE OF FINANCE

The bank of Sweden Tercentenary Fund

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SUMMARY

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In the report the concept of distance education is analyzed and defined. The main part of the report presents a survey of the literature concerning the use of the telephone in education. Four different ways are pointed out where the telephone is used either as a substitute for other instructional forms or as a supplement to conventional instruction, such as classroom instruction, correspondence instruction. The four modes: teleteaching, telelecturing, dial-access, and teletutoring, are presented on the basis of previous research carried out.

Key words: Distance education, telephone instruction, adult education

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INTRODUCTION

The research project "Two-Way Communication in Correspondence Education" has previously been presented in a report, where the concrete plans of the experimentation are discussed (Bååth & Flinck, 1973). The research work is being carried out on the educational system where the students learn without being physically present at a particular school or institution. The students participating in our investigation are studying with the help of correspondence courses, which mainly consist of printed material. One of the most essential characteristics of a correspondence course is the written correspondence by letter between the school and the learner. Our task is to study how the interaction between the school and the learner, and between the learners, can be improved.

One of the experimental series being carried out concerns postal two-way communication supplemented by telephone instruction. The main purpose of this report is to present the way in which the telephone has been utilized in educational contexts. First, however, we shall discuss those concepts which have been used to describe the educational situations where the teacher and the student are separated in time and space. We intend to use the concept distance education and we will describe our definition of it. After that we will present a review of the literature concerning the use of the telephone in education. It will be proved that only in a few cases has the telephone been utilized together with correspondence courses, despite the fact that it could be an excellent supplement for improving the two-way communication.

THE CONCEPT OF DISTANCE EDUCATION

When studying the literature concerning this teaching method, one will find no common usage of terms. In reports and articles many different terms are used despite no particular differences in the meaning. Distance education, distance instruction, distance teaching, tele-teaching, home study, correspondence education, correspondence study, correspondence instruction, correspondence teaching are some expressions used to describe the educational system of teaching a student not physically present in the class-room.

As mentioned above the terms correspondence education, correspondence instruction, and correspondence teaching are all used. Apart from the question of which of the terms education, instruction, and teaching should be used, all of the combined terms indicate a kind of distance between the student and the teacher. They are in contact with one another by correspondence. Student and teacher are sending information to each other in writing - by letter. In practice, however, this two-way communication does not necessarily imply only written communication. Frequently schools supplement their courses with tapes, telephone contact, or group-meetings. But then it may be questioned whether this is true correspondence teaching. The basic component is the correspondence course which presupposes written two-way communication between student and teacher but when used together with tapes, or telephone, or group-meetings, it is fortified correspondence teaching. Correspondence teaching can be seen as subordinate to the concept distance teaching, and we can accept a definition of correspondence teaching analogous to the definition of correspondence study which Good gives as the

> "... formal study and instruction conducted by mail using texts, course outlines, and other materials, with lesson reports, corrections and examinations." (Good, 1945, p 103)

This meaning is shared by Erdos (1967) when she defines correspondence teaching as

> "... a method of teaching in which the teacher bears the responsibility of imparting knowledge and skill to a student who does not receive instruction orally, but who studies in a place and at a time determined by his individual circumstances." (Erdos, 1967, p 10)

These restrictions of the concept are lifted out both in practice and in theory. Glatter & Wedell (1971) state:

> "For our purpose correspondence education can be defined as organised provision for instruction and education through the post, although postal tuition can be supplemented by many other distance media, as well as by face-to-face teaching." (Glatter Wedell, 1971, p 11)

The same opinion is given by El-Bushra (1973), stating about correspondence teaching:

> "In its most basic, literal interpretation it is used to refer to teaching conducted by written two-way communication sent through the post. More recently correspondence teaching has been seen more broadly and postal lessons have been linked with other media. Poetry readings on the radio, televised documentaries, home science kits, language records, tutor-led study-groups, and counselling services to iron out student problems - all these are additional parts of the instructional 'package' which illuminate the basic textual lesson. So what began as a strictly limited sort of activity - written communication - has been developed into a broad approach to instruction of which correspondence as such is only one element." (El-Bushra, 1973, p 5-6)

El-Bushra continues to describe this approach of instruction as distance education, meaning that the physical distance, between the teacher and the student is the only fact which distinguishes it from the class-room situation. Wedell (1970) is mainly of the same opinion but he keeps the term correspondence education to describe almost the same content. In a report from the Council of Europe he discusses the concept of permanent education which he means is not just adult education but includes all education at different stages in the life span. He then states that

> "... correspondence education is no longer a term which can be defined in simple terms. Increasingly the traditional element in correspondence education, that is sending of an ordered sequence of lessons to students through the post with or without opportunities for the correction of exercises returned by the student, is being replaced by more elaborate arrangements combining a number of teaching and learning facilities. This multi-media approach has become possible partly by the expansion of the media of mass communication and partly by the extension of the methodological basis of long-distance study." (Wedell, 1970, p 10)

MacKenzie et al (1968) use the term correspondence instruction. Their definition is:

> "Correspondence instruction is a method of instruction in which correspondence is the means of communication between student and teacher." (MacKenzie et al, 1968, p 2)

According to the communication between the student and the teacher they are making a further distinction when they declare that

> "... correspondence instruction refers only to instruction offered through correspondence which requires interaction between the student and the instructing institution. Under this definition, a program in which the student receives a book or series of pamphlets but is not required to submit any responses for evaluation by the instructional body would not qualify as correspondence instruction. There is one-way action (on the part of the instructional institution) but not interaction." (MacKenzie et al, 1968, p 3-4)

They also add the qualification that the interaction in most cases is carried out through mail. This is only one of several possible means of distribution.

In this context we can bring up the German terminology mainly using the word 'Fern-' in different ways which should be translated as 'distant, remote'. 'Fernstudium' and 'Fernunterricht' are the most common terms. Translated 'Fernstudium' should be 'distance study', and 'Fernunterricht' 'distance teaching'. But the distinction between the terms is that 'Fernstudium' refers to distance teaching at university and college levels, and 'Fernunterricht' to distance teaching at other, lower levels (see Dohmen, 1967). There are no fundamental differences in the didactic structure of 'Fernstudium' and 'Fernunterricht' (Peters, 1973).

In another context Dohmen defines 'Fernstudium' as

> "... ein Studium, das fern und unabhängig von direkt-persönlich unterrichtenden Dozenten stattfindet und das doch, im Gegensatz zum reinen Selbststudium, indirekt über nicht-personale Medien angeregt und durch periodische Studienanleitungen, Materialsendungen usw. aus einer (grösseren oder kleineren) Entfernung geleitet bsw. unterstützt wird." (Dohmen, 1970, p 53)

Dohmen (1970) also mentions 'Korrespondenz-Fernstudium' (correspondence study) and suggests that it deals with just the written, mailed material and that the method is insufficient e g in a social study context, or in practical study phases. To avoid this insufficiency other media must supplement the written material.

It must then be recognized that 'distance' (education) as a term is the principal concept and that a term like 'correspondence' (education), is subordinate to the concept 'distance'.

Above we have also mentioned that terms like 'home study' and 'tele-teaching' are used. 'Home study' is commonly used - mostly in the United States - by correspondence institutes. As we see it the term refers more to the place where the study is undertaken or even gives the impression of being without control of a teaching institution. Erdos (1967) is of the opinion that home study is sometimes interpreted in the restricted sence of self-instruction. It seems to us that the term does not determine unique conditions for the distance learners.

'Tele-teaching' is sometimes used especially when radio and/or television is an integral part of the system. Lefranc (1973) has stated:

> "The term 'tele-teaching' which is sometimes used in this study for the sake of convenience, should not be taken to mean 'teaching by television'; it denotes any teaching done 'from a distance'" (from the Greek tele, distant). (Lefranc, 1973, p 1)

For our purpose the term could be used, but to avoid any confusion with the exclusive use of tele-media, such as television, telephone, radio etc we refrain from using the term. To indicate that the teacher and the student are separated from each other the term 'distance' is more practicable.

The terms education, instruction and teaching are combined with 'distance' in different ways, in most cases with a similar meaning. Holmberg (1974) gives a definition of distance education when he states:

> "I use it to denote the forms of study which are not led or controlled by teachers present in class-rooms or similar localities but nevertheless benefit from the planning, guidance and teaching of tutors. Distance education, as I use the term, in most cases implies that the students themselves are responsible for the pace and completion of their studies." (Holmberg, 1974, p 1)

On the communication between the teacher and the student he declares:

> "Distance education goes further than merely teaching and practising by writing and learning by reading. Other means of communication

are also possible. An important element in distance education is the interaction between students and teachers in the form of two-way communication, usually in writing, sometimes by telephone or recordings of the spoken word." (Holmberg, 1974, p 3)

Other definitions of the terms must be mentioned. Moore (1973) has tried to develop a theory of independent learning and teaching. He emphasizes that

> "... independent learning and teaching is a system consisting of three sub-systems: a learner, a teacher, and a method of communication." (Moore, 1973, p 663)

The statement does not exclude the common face-to-face teaching in a class-room because even there we will have the learner, the teacher, and a communication method. To differentiate distance situation and, what Moore calls, 'the contiguous situation' it will be necessary to consider more closely upon 'the methods of communication'. Therefore Moore defines distance teaching:

> "... as the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors, including those that in a contiguous situation would be performed in the learner's presence, so that communication between the teacher and the learner must be facilitated by print, electronics, mechanical or other devices." (Moore, 1973, p 664)

He continues:

> "Modern distance teaching may even employ more than one communications medium. Twenty years ago it was possible for a learner to obtain instruction through any one of a number of media, or to put together into a system of his own, a combination of media ... Only in recent years, though, have teachers and media specialists actually prepared instructional packages that are designed to employ a number of media in an integrated manner." (Moore, 1973, p 665)

The essential role of communication between teacher and learner in distance education has been obvious in recent years. Other definitions deal with the same thing.

> "The term 'distance teaching' connotes systems of teaching and learning based mainly on non-personal media, whose efficiency for student performance is controlled by two-way communication (feedback). Terminological confusion, however, arises from the fact that these media are also used in face-to-face tuition, and conversely, that traditional distance teaching is supplemented by

that these media are also used in face-to-face tuition, and conversely, that traditional distance teaching is supplemented by face-to-face methods." (Karow & Kreigenfeld, 1973, p 49)

It will be seen from the foregoing discussion that the distance itself is an essential characteristic in distance education and that it can be bridged over by means of different communication media.

We can also discuss which of the terms 'teaching', 'education', or 'instruction' we are going to use. Studying relevant research literature within the field we have found that these three concepts have been used rather interchangeably.

As a matter of fact this is rather logical with regard to the definitions Webster gives to the terms.

"Education: the process of training and developing the knowledge, skill, mind, character, etc, especially by formal schooling; teaching; training." (Webster, 1968, p 576)

"Instruction: (1) an instructing; education, (2) knowledge, information, etc given or taught; any teaching; lesson." (Webster, 1968, p 952)

"Teach: (1) to show how to do something; to give instructions to; to train; (2) to give lessons to (a student or pupil); to guide the study of; to instruct." (Webster, 1968, p 1870)

From a semantic point of view the terms are used interchangeably. One of the terms is used to define the others. We can, of course, study definitions presented in educational textbooks and handbooks, but even here the concepts are used in the same way.

In Good (1945), Dictionary of Education, the term education is defined as

"... the aggregate of all the processes by means of which a person developes abilities, attitudes, and other forms of behavior of positive value in the society in which he lives." (Good, 1945, p 145)

This means a broad view emphasising the entire upbringing, but we could also find statements more specific as when Bloom et al (1971) declare:

> "Education for us is a process which changes the learners. Given this view we expect each program, course, and unit of education to bring about some significant change or changes in the students. Students should be different at the end of a unit from what they were before it. Students who have completed a unit of education should be different from those who have not had it. Although it is true that some of the differences in a learner between the beginning and the end of secondary school are to be attributed to maturation, growth, and the influences of varied experiences, we are here concerned with the changes produced by education and in the last analysis determined by the school, curriculum, and instruction." (Bloom et al 1971, p 8)

As to the other two concepts which can be used - teaching and instruction - it is still more difficult to find homogeneity in the definitions. These concepts are almost always associated with certain theories of learning or teaching (see e g Skinner, 1968, Gagnē, 1970). In this context therefore it may not be quite fair to disconnect them from their context. As we do not want to connect the progress of studying at a distance with a certain theory of teaching or instruction we are going to use the term education in our description. Maybe Rawson-Jones (1974) is right when he declares, about the terms distance teaching and distance learning:

> "Distance teaching seems too teacher-oriented and distance learning too student-based. Distance education combines the two, so, in the absence of a better name for the process, I shall use it ..." (Rawson-Jones, 1974, p 61)

Thus we are going to use the term distance education by which we mean an educational system where the teaching behaviors are separate from the learning behaviors. The learner works - alone or in a group - guided by study material arranged by the instructor who together with the tutors is in a location apart from the students, who however have the opportunity to communicate with a tutor/tutors with the aid of one or more media such as correspondence, telephone, television, radio. Distance education may be combined with various forms of face-to-face meetings.

THE TELEPHONE IN DISTANCE EDUCATION

In one of the experimental series in the research project the problem is to study if it is possible to reinforce the postal two-way communication with the help of the telephone.

The students participating in the experiment are studying correspondence courses in a traditional way. They are enrolled in the courses without any knowledge of the experimentation. From a certain date the school divides all new enrollments into two groups, one experimental group and one control group. At this moment the students are informed that they are involved in an educational experiment. The two groups do not receive exactly the same information. The students in the experimental group are informed that the tutor will phone them after returning their corrected exercises. The other group of students is not given this information. They are only informed that an experiment is going on. They have to know that we collect information which will be used as background data from both groups.

In this experiment the telephone will be used as a supporting aid for the tutor. It will give the tutor an opportunity to explain difficulties in the course material but it will also give the student a chance to obtain personal assistance in different ways.

In a future report we will describe the design of the experiment in detail. Here we present a survey of the use of the telephone as an educational communication medium. First of all we have to decide what a medium is, because different definitions have been given depending on the context in which the concept it used.

A medium

Medium or media is a very confusing term. Studying the literature concerning media research we find different meanings of the concept. On one point alone we find a conformity which is expressed by Bretz' (1971) very broad definition of medium when he declares that

> "... a medium is something in the middle, between other things ..." (Bretz, 1971, p 5)

So far all agree. If we look at education - in an extremely simplistic form - as a structure with the three components (1) a body of knowledge, attitudes, etc; (2) a delivery system; and (3) a learner, then the medium must be the delivery system. But there are differences in the interpretation of the more specific content of the concept medium as a delivery system.

In a textbook concerning selection of instructional media, Gerlach & Ely (1971) give a broad definition of medium as

> "... any person, material, or event that establishes conditions which enable the learner to acquire knowledge, skills, and attitudes." (Gerlach & Ely, 1971, p 282)

But the next moment they are delimiting the concept

> "In the context of this book, however, media will be defined as the graphic, photographic, electronic, or mechanical means for arresting, processing, and reconstituting visual or verbal information." (Gerlach & Ely, 1971, p 282)

If we return to Bretz (1971) he makes a definite distinction between media which are instructional aids, supporting a teacher's presentation, and media which are self-supporting. The latter he calls communication media, and he defines these thus:

> "A communication medium, within its specific limits, is capable of the entirety of information presentation and of instigating learner/subject matter interaction. Moreover, communication media programs can be widely reproducible." (Bretz, 1971, p 6)

He also distinguishes between "telemedia" and "recording media" but includes both in communication media. Telemedia are those which electronically transmit information to the learner in real time, while recording media are media which record and store.

Briggs et al (1967) have in a report developed a procedure for choosing media for instruction. Their definition of media is more complex than Bretz'. To them

> "... media refers to any and all physical means of representing the entire set of stimulus conditions required in the instruction of a learner. Thus media include, as important and oftenused varities,

arrangements for printed communication (such as printed pages) and for oral communication (such as a teacher). Also included are actual objects (rocks, leaves, manufactured products, etc) when these can be directly observed by learner, and special devices and materials, such as films, teaching machines, and workbooks." (Briggs et al, 1967, p 29)

Both Bretz' and Briggs' et al definitions are complex. Of great interest in this context are Tosti & Ball (1969) when they discuss a major fault in most procedures of designing instruction. They mean that most researchers do not recognize the distinction between medium, presentation form, and content. The most serious confusion is observed between medium and presentation form:

"Media researchers to date have not chosen to distinguish a presentation form from the media which carry that form. This new model requires that such a separation be made. The media in instructional systems carry not only the data of the instructional message but also data on students' responses and various other bits of data necessary to maintain the operating systems. It is the structure by which the information is carried by a medium that is called the presentation form. A student does not learn from the media. He learns from the presentation form. Media do little more than deliver the informaion to be learned in whatever presentational form previously decided upon." (Tosti & Ball, 1969, p 9-10)

If we take advantage of this statement by Tosti & Ball in our simplistic description of education (see p 10) we can say that information from a body of knowledge presented in a particular form can be delivered to a learner by a medium. Then the medium is an aid.

For our purpose we will look at the telephone as a medium in this way. It is the instructional aid which gives a teacher the possibility of establishing a two-way communication with a student participating in distance education.

When we look at the telephone as a communication medium we will look at it as a part of a communication system involving other media. The telephone has a function in a user system, where it is coordinated by the user with many other functions to be successful as a system. Bretz (1971) discusses this point very carefully in the context of the evaluation of communication. He means that commonly the relation is that a communication medium must be less effective - in terms of achieving a desired result - than

face-to-face communication. This can be both true and false, depending on which factors are considered. He exemplifies by the use of television in instruction:

> "When television is introduced into an instructional system to replace certain traditional elements of that system, it can have qualitative advantages over what has been done before. Television lessons can be better prepared and can bring better teachers into the average classroom, despite the tendency of media presentations to be impersonal. To some people this impersonality seems like a large obstacle to effectiveness ... It is often expected, therefore, that students who receive lesson presentation by instructional media will achieve poorer results than students who have been taught by traditional classroom methods. If this is so, it has not been detected in a very large number of comparative studies. Neither has any evidence been found to show that presentation via an instructional medium, per se, results in any greater scholastic achievement than classroom presentation." (Bretz, 1971, p 47)

Bretz means that this can be interpreted in different ways "depending on the prior bias of the interpreter". To evaluate the medium we have to consider as many elements as possible and try to study their interrelations.

Review of research in telephone instruction

In educational contexts the telephone has been used in different ways. From the literature we can discern four varying modes of application for using the telephone. These four modes are: teleteaching, telelecturing, dial access, and teletutoring. The use of each of the methods has been described and reported more or less scientifically. Much time and space has been devoted to presenting the efforts to evaluate all experiments concerning telephone instruction, but very few of them are scientifically based.

In our research project we will use the fourth mode - teletutoring. Our search of literature has, however, been carried out with respect to the use of the telephone in all educational situations. Therefore we intend to present all relevant information about the usage. Even if we are using just teletutoring other modes can be used in other forms of distance education.

Our presentation will be divided into four sections, each of them dealing with one of the modes mentioned above. Before that we will give a short description of the four ways of using the telephone.

Teleteaching is operated by means of a two-way transmitter (telephone) placed in a classroom, and enable a sick or handicapped student to keep up with his class work without being physically present in the classroom. The student can at home hear all that is going on in the classroom, and he can indicate by means of a signal when he wants to speak and answer questions. When he speaks everybody in the classroom is albe to hear what he says, as if he were present.

Telelecture also operates by means of a two-way transmitter. A teacher can through the use of the telephone - located anywhere in the country - give a lecture - simultaneously - to one or several groups of students located in different places. The teacher's voice is amplified in the classroom, and the students can communicate with the teacher through a series of microphones connected to the telephone line.

Dial-access is an information service system that provides a person with brief summaries on different topics. The summaries are recorded on tape and available by dialling an operator or a computer who switches the call to a playback machine and inserts the tape cartridge requested. Most dial-access systems operate in connection with libraries.

Teletutoring enables a student by means of a telephone to get in touch with his tutor for individual help in his studies. The student is studying independently with the help of preproduced study material such as a correspondence course. The tutor then calls the student - or the student calls the tutor - and they discuss the work. This two-way communication is always between one student and one tutor.

Teleteaching

Historically the use of the telephone as an educational medium is quite young. Rao & Hicks (1972) report that the first instructional application of a telephone for an educational purpose occurred in 1939. A project was initiated to meet the needs of homebound and hospitalized students. The homebound students received all lectures in the class by telephone during the entire schoolday. They were also able to talk to the teacher and their class-fellows. More experiments of this kind were conducted at different places in USA.

In New York City the Board of Education developed an experiment to meet the needs of physically handicapped, homebound adolescents. In a report Lolis (1968) describes the experiment and the results from the evaluative study conducted with the experiment. During a period of 15 months a group of physically handicapped students had the possibility of receiving tele-lectures from their schools. The lectures were distributed by radio broadcast combined with group-telephone-lectures, and regular visits of teachers. The students were divided into two groups. 30 students formed an experimental group and 23 students a control group. Each day the two groups had a radio broadcast of 15 minutes. After the broadcast, the experimental group had the opportunity to talk to their teacher by telephone, while the control group had not. At the end of the 15 minute broadcast the students in the experimental group were able to tune in to the class and talk for 30 minutes to the teacher, to the class in the classroom, and to the other students on home instruction studying the same subject.

For evaluation the research team studied the intellectual, academic, and socio-emotional development of the students. No significant differences were found between the two groups in intellectual or academic development, or in social maturity. But a certain increase in positive orientation towards social interests was shown by the experimental group.

We have found no other evaluative studies of the teleteaching method, but many articles and reports mention the method as very successful. The facility makes two-way communication possible between the homebound student and a regular classroom. The student can hear every word spoken in the classroom, and every person in the classroom can hear the student in return. Rao & Hicks (1972) refer to a California experiment where this service is given to all students exempted from school by illness or accident. The equipment in that service programme allows group communication between the participating, sick students as well as individual communication. Duhrels (1965) - a teacher at a High School - gives a personal statement of how she taught a girl so crippled by cerebral palsy that she could not be in the classroom. The subject taught was type-writing and the teaching was very successful.

Of course this method using a telephone to teach students who are not able to be present in the classroom due to any handicap will simplify the education

of these students, and perhaps be less expensive than engaging a home teacher. But as Lewis (1966) remarks:

> "These systems must be considered a supplement to and not a substitute for the home teacher since adequate personal teacher supervision is a requisite in such instances. However with this approach fewer hours pf personal involvement may be required for some cases. The cost of such hookups through most telephone companies average between $ 15 and $ 25 per month depending upon the distance involved and the number of intercom units." (Lewis, 1969, p 116)

As mentioned very few evaluative studies have been carried out concerning teleteaching. The method is used in many places but because of the small number of students at each place it is very difficult to make an evaluation of the method.

Telelecture

According to the literature there has been much more experimentation and utilization with telelecture. In contrast to the method of teleteaching several evaluated studies of telelecturing have been made. Two reports must be referred in this context which sum up what has been done.

Puzzuoli (1970) has been studying the method mainly on university level. He starts with a survey of the method:

> "A review of the literature relating to the use of the telelecture indicates that the method is implemented through various models. The tele-lecture has been used with such supportive aids as slow-scan television, electro-writers, 35 mm slides, overhead projectuals, reading materials, films and printed hand-outs. These aids are used to increase the breadth, impact, and specificity of the telelecture program." (Puzzuoli, 1970, p 4)

He then describes different and various modes of utilization where the main purpose is to bring experts to an audience. He has been studying reports and articles concerning the use of telelecture and summarizes his references by saying:

> "It was found that tele-lecture was used to enrich audience knowledge, provide a communications network, teach formal classes, supplement classroom resources, share professional talent, and increase the impact and range of professional expertise." (Puzzuoli, 1970, p 20)

We have to return to Puzzuoli later. The other report presenting evaluative studies of telelecturing has been published by Hoyt & Frye (1972). Besides their own experimentations they have carried out a literature search and state that previous research in telelecturing has shown no differences between the use of telelecture and face-to-face instruction. They mean that further experimentations are justifiable. Final generalizations cannot be made from previous experiments mainly for the following reasons:

> "1. Samples have tended to be so small that there is a considerable risk that erros of the second type (announcing no differences when, in fact, there are true differences) might be committed;
>
> 2. The initial comparability of the telelecture and control groups was not always established by pretests;
>
> 3. When pre-tests were administered, they were not used to reduce the unexplained variance in post-test results and thereby refine conclusions regarding the relative effectiveness of the competing systems;
>
> 4. Evaluations were seldom comprehensive in the sence that objectives other than academic achievement were studied. None of the seven formal evaluation studies examined student gains on affective or psychomotor objectives. More importantly, none considered measuring success' from the student's frame of reference." (Hoyt & Frye, 1972, p 7)

Hoyt & Frey base their statements on several studies where more or less controlled conditions were established. Seven of the studies (Nunley, 1965; Boswell et el, 1968; Edelman, 1968; Blackwood & Trent, 1968; Puzzuoli, 1970; Spears, 1970; Wecke, 1970) were performed on a scientific experimental basis and we will review them below.

As mentioned above telelecture differs from teleteaching in the sense that in telelecturing the information is transmitted to a group of students while teleteaching is transmitted to single students. Telelecture has been defined in different ways from very short statements to more comprehensive definitions. Davies (1966) defines telelecture as "closed-circuit telephone network". Bretz (1971) from his point of view looks at telelecture as

> "... a multimedia system in which the telephone is augmented by the addition of visual elements from locally projected materials. In its simplest form, the visual component may consist of a single projected slide of the face of the lecture. More commonly, the visual element

> will consist of a set of slides that have been produced at the institution originating the lecture and sent out in advance to each location where the program will be presented." (Bretz, 1971, p 133)

We think that neither definition of telelecture points out an essential component in the method, which is the possibility of two-way communication at a distance. Kruck & Tversky (1971) make this more distinct when they describe telelecture as

> "... a pre-arranged phone call from the classroom to a resource person, providing students the opportunity to ask questions and to make comments with responces coming back amplified." (Kruck & Tversky, 1971, p 21)

Perhaps even more distinct is Puzzuoli's definition of telelecture as

> "... a two-way amplified communications system designed to bring together individuals and/or groups by means of a regular telephone network. Through the use of the tele-lecture, a speaker may present an address to one or more groups, simultaneously, located in one or more different sites across a region, state, or the Nation." (Puzzuoli, 1970, p 3)

According to this definition the telelecture can be used in different ways and for different motives. The essential motive in distance education in general and in telelecture in particular is how to allocate resources - people, equipment - to satisfy a demand. Most of the experiments using telelecture concern schools, colleges, university with restricted material and personnel resources. In some cases a couple of schools have brought together their complete resources of teachers to give all the students at the single school the same possibility of receiving the best instruction. (Beattie & Frick, 1963; Madden, 1964; Madden, 1967.) A teacher with excellent knowledge in a specific subject at a local site has given a lecture to all classes in the cooperative school-system by means of a telephone. Sometimes the arrangments are less permanent when a school with small material and personnel resources for a specific subject engages a teacher from another school (Cook, 1963; Edelman, 1968; Clarke, 1970), or engages a resource person to provide the students with the opportunity to ask questions with responses coming back (Moore, 1965; Snellman et al, 1966; Kruck & Tversky, 1971; Hartje, 1973). The most exclusive is described by Moore (1965) who reports on a 15 minute

long distance telephone interview with the vice-president of the Federal Republic of Germany when 200 students studying German in California had the opportunity to ask Mr Mende some questions and had them answered.

Sometimes this lack of resources on the personal side can have drastic consequences. In an unsigned article in American Education, 1966, there is a report about a school district having difficulties in getting teachers to the school. The school was located on Block Island, an island "sitting some 13 wave-tossed miles off the Rhode Island coast". Once a teacher had made the trip between the mainland and the island and back again he never did it again! To bring teaching to the students they have to arrange for telelectures from the teacher on the mainland to the students on the island.

Another reason for establishing telelectures has been when the "students" did not have the possibility to go to a classroom because of their jobs. In Wisconsin, USA, a system has been developed to meet a need for continuing education to medical doctors, nurses, social workers, and so on (Parker, 1974). The participants are brought together at a hospital or a court house in several places and are connected by means of a telephone line to receive a telelecture. In other cases teachers continuing their training are brought together to a telelecture (Davis, 1966; Wakefield & Vaden, 1973). A couple of articles also show that in order to save money conferences can be arranged as telelectures (Paulson, 1963; Quinn, 1966).

This survey of different reasons for arranging telelectures shows that a telelecture can be established as three alternative models:

"1. an external speaker presenting an address to a single group;

2. an external speaker presenting an address to a number of groups in a number of site locations;

3. interaction of a number of speakers/audiences at a number of different site locations." (Puzzuoli, 1970, p 4)

Of course it can be discussed if there are any essential differences between the three models. The first two differ only in the number of groups receiving the telelecture, the last two in the number of speakers (teachers) or that in model three there can be an interaction between the groups receiving the

lecture. When studying the literature we have found that model 2 is most and 3 least common.

Model 1 is often used in situations where the supply of qualified teachers has been small. Such situations are described by Moore (1965), Morton & Burns (1966), Snellman et al (1966), Kruck & Tversky (1971), and Hartje (1973). None of these telelectures has been evaluated seriosly and in all cases there were only telelectures. In other instances evaluations have been made, sometimes comparing the telelectures with conventional face-to-face instruction. Gold (1973) presents a study where 5 site locations were involved and where the teacher rotated his presence between the sites. He always taught one class face-to-face, while the other four received the lecture simultaneously by telephone. The evaluation consisted of asking the students their opinion, and the answers indicated that they had a positive attitude to the method.

More serious studies have been carried out by Beattie & Frick (1963), Mandelbaum (1966), Blackwood & Trent (1968), and Puzzuoli (1970). Beattie & Frick (1963) made four plans for their experiment but only two of them were used. In the first plan the students had a telelecture of 30 minutes. They then had 10 minutes to formulate questions which they wanted to be answered, followed by a 20 minute question period together with the tele-teacher. The second plan had a 30 minute telelecture, and then the teacher called them back the next day for a 30 minute question period. The results indicated that the second plan was the best one. The students had more time to formulate questions and the questions were more qualified. Mandelbaum (1966) reports on an experiment where experts in six different subjects were engaged. The lecture were given to varying numbers of students. Both the teachers and the students were interviewed after the lectures. The teachers thought that telelectures would be successful if used at high levels of specialization, demand a lot of preparation, and perhaps would be more effective in a discussion situation. Blackwood & Trent (1968) evaluated telelecturing and face-to-face teaching with the hypothesis that there were no differences. 71 students were divided into two groups by means of random sampling. The teacher lectured the face-to-face group simultaneously with the remote group. The results indicated that there were no differences in the amount of learning between the groups, no differences depending on different educational levels among

the students. Nor did they find any differences in attitudes for the total group but some slight relationship could be observed. Students of ages 35-44 were more positive to remote teaching, and students 45-64 liked face-to-face teaching better. The authors conclude the report by stating:

> "The review of the literature and careful examination of the data collected for this study indicate that the greatest amount of learning (in terms of immediate recall) takes place during the early part of a remote lecture. Perhaps the adult educator's best use of the remote teaching technique would be as a supplement to a meeting or class rather than the total resource." (Blackwood & Trent, 1968, p 15)

Puzzuoli (1970) wanted to determine relevant methods for teaching by telelecture on university extension courses. He used two groups of subjects. 15 students, full-time employees of a Mining Industry, received for 15 weeks 3 hours per week telelectures on the subject Mining Engineering. In the other series 13 elementary school teachers got a course in Modern Mathematics, also 15 weeks with 3 hours per week. Simultaneously with the telelectures a couple of students followed the lectures on campus. The results showed that the achievement of students taught by telelecture was equal to or greater than the achievement of students enrolled in on campus course. It was also obvious that the success was greater if the teacher limited the amount of information by telephone to 20-25 minutes, provided the students with varied printed material, used audio-visual media in the classroom, visited the remote students, and based the lecture on the problem-solving technique.

Several programs have been carried out in model 2, mentioned above, where an external speaker presents an address to a number of groups at a number of different site locations. Many of them have not been accompanied by a more penetrating evaluation. Madden (1964), Davis (1966), Quinn (1966), Madden (1967), Clarke (1970), Heiliger (1972), and Punwar (1972) are all examples of this kind. In almost all cases the authors report that the method was inexpensive and that the students were very positive. But some problems are reported. There have been technical problems in the connections, there have been co-ordination problems in scheduling all classes at a given time, but on the whole there is a general inclination to continue the activities.

A study of great interest with a limited evaluation has been carried out in Wisconsin by Cooper & Lutze (1970). In Wisconsin as in most countries in the world there was a shortage of nurses in practice. Several refresher courses had been arranged for inactive nurses who wanted to return to work after being non-practising for many years. Many of these presumptive returning nurses lived out in the state and had no opportunity to follow these centralized courses. In order to give all returning nurses wherever they lived a chance to participate a project was started to deliver the retraining by telephone and radio. The lectures were given by radio to a great number of listening stations where the "students" were connected with the radio studio by telephone to allow two-way communication with the teacher. An informal evaluation indicated that the nurses were satisfied. The main aim was to get these inactive nurses to return to a professional job, but no pressure was placed upon them. The results showed, however, that this happened. Of the 550 enrolled in the study 12 per cent returned to practice, and several of them indicated that they returned to practice earlier than they intended. There are plans for another type of course, a course to help new graduate nurses to combine marriage and career. During their inactive period - mainly child-bearing years - the courses could help them to keep in touch with the profession and to keep them aware of changes in their field.

In another study in Wisconsin Regan & Haasch (1970) showed that telelecturing was fruitful in training nurses. In this study too the telephone network of Wisconsin was used. A number of nurses were placed at a number of listening stations with a conference telephone. Lectures about tuberculosis were given by experts from a studio, and two-way communication was possible. Even this opportunity to provide continuing education for nurses was personally satisfying for the nurses and the information they obtained was very useful to them in their work.

Other studies in telelecturing have been of a more experimental nature. Nunley (1965) studied the effectiveness of telelecture in retraining elementary school teachers in Mathematics. Two groups were taught simultaneously, one group by telelecture, one conventionally. Tests were given to all students. Pre-tests and post-tests of achievement, mathematical ability test, and attitude inventory. The mean change in content mastery was significantly greater for the telelecture group than for the conventionally taught group. But the difference could not be accounted for by differences in

ability, teaching attitudes or personal background. The results indicate that the method of telelecturing is an effective method for retraining teachers.

Boswell et al (1968) carried out a study in distance teaching on university level. The subject was a course in Introductory Psychology. Three classes were involved. One group was a control group and was taught conventionally on campus. The second group was also taught conventionally on campus but simultaneously with the third group, which received a telelecture in a remote classroom. They found no differences between the three groups in content knowledge measured by pre-test and post-test. This study was an initial study which was followed by an application study where five credit courses were offered. In these both simultaneous and straight telelectures were used. The findings were that the technique was applicable but in addition to technical transmission problems there were other problems. One of these stemmed from a difference in specific background knowledge of the students on campus and remote. Having a number of students in front of him -- face-to-face - the teacher could - depending on the student's reaction to what he says - adapt his presentation to the background knowledge of the students. This is not possible with the remote students.

Another study has been carried out by Edelman (1968). The task was to teach Hebrew, both reading and writing - to adults. Two classes were arranged to receive telelectures, and one class served as a control-group receiving traditional lectures. The same teacher, material, curriculum and time schedule were used in all groups. The classes were identical in terms of range of age, sex distribution, and previous knowledge of Hebrew. Pre-test and post-test were administered, and the students received one lecture per week for 10 weeks. The results showed no differences between the groups in the amount learnt by the students, and the conclusion was that:

> "Teaching by electronic devices can be as successful as the usual method of class-room teaching. The talents of a master teacher can be effectively 'shared' in geographically scattered locations." (Edelman, 1968, p. 164)

Two other studies by Spears (1971), and by Stutzman & Grigsby (1973) using the same method of teaching one on-campus class and remote classes simultaneously indicate the same results, that no differences were found in the amount of knowledge acquired by the students after the teaching period.

The subjects were quite different. Spears (1971) reports on a workshop for members of the American Dietetic Association, while Stutzman & Grigsby (1973) give an account of off-campus courses in electrical engineering.

As mentioned earlier Hoyt & Frye (1972) have made an excellent presentation of research carried out on telelecturing. We have named their criticism of previous research earlier (see p. 16). They have, however, also done their own research on telelecture to find out if telecommunication delivery systems are as effective as class-room procedures regarded from both the teachers' and the students' points of view. They even asked if certain pre-dispositions of the students could be used to predict which student would profit most from telecommunication and standard class-room method respectively. Six different subjects were chosen. The praticipation of the students was optional and the pre-test was given. In the experiment 77 students joined the on-campus classes, and 254 students were remote students. The main conclusions drawn by the writers from their experimentation were that the educational success regarded from the instructor's view and from the student's view was relatively independent of each other. Telelecture and class-room instruction were equally effective delivery systems seen from the instructor's frame of reference. From the viewpoint ot the students telelecture instruction was at least as effective as on-campus instruction. Furthermore the successful telelecture student was found to be "more self-reliant and independent than successful on-campus students" (Hoyt & Frye, 1972, p. 41).

As we pointed out earlier it is difficult to separate model 1 from model 2. The only difference is that in model 2 there are two or more groups receiving the lectures. Model 3 according to Puzzuoli (1970), is distinguished from the other two models in that a number of speakers/audience are interacting in the telelecture. It could be called - in some cases - tele-conference. One example of this telelecture used in a conference is described by Paulson (1963) where a meeting with the Audio-Visual Education Association of Iowa was held by means of a telelecture. The reason was economical. The Association had not the money to bring experts from different parts of the U.S. The solution was to let the experts stay in their offices, connect them with the audiences at different site locations in Iowa by means of the telephone, and hold the meeting. In another study by Wakefield & Vaden (1973) a number of elementary school teachers on 18 stations was taught a course in nutrition education. The students

and their teachers met once a week for 3 hours during 8 weeks. Faculty members, guest lectures, and resource persons outside the department were involved throughout the entire course. Two months after the completion of the course a follow-up survey was conducted. This indicated that the teachers had enlarged their own teaching in nutrition by activating themselves and their own students, that they had written for new materials, and that they had recommended the course to fellow teachers.

Perhaps the most exclusive study of telelecturing by this model has been conducted in Wisconsin. Parker (1974) reports on the project ETN-SCA which includes Educational Telephone Network and Subsidiary Communication Authorization - a specific electronic function on the FM-radio channel. ETN is a telephone network used for transmission of educational materials. It was developed to meet a growing need for continuing education of medical doctors in the state of Wisconsin. This activity started in 1965. Since then the programmes have expanded to cover other areas where continuing education was necessary and desirable. Today the subjects transmitted cover e.g. Pharmacy, Law, Social Work, Library Science, Nursing. Parker has designated the method as "a huge party line with a number of parties on the same line" (Parker, 1974, p. 34). The students meet in hospitals, schools, court houses or the like and receive their lecture there. All these places are connected with each other and with a station where the teacher is. The teacher presents his lesson and then there is a discussion between the teacher and/or the students. Parker (1972) has also done some experimentation with compressed-speech, where by means of special equipment the teacher's speech is tape-recorded so that the output is presented at a higher rate than the initial recording. More time is then available for discussion during the time settled beforehand for the lecture. The activities are evaluated continously and are going to be extended. ETN is today transmitting an average of 100 hours per week.

Independently of the model used the telelectures are often completed with visual supplies sent to the students in advance. It can be slides, transparencies, filmstrips, printed material, videotapes. It is, however, possible to use a telephone line to transmit visual information by using a telewriter or electrowriter. This method of transmitting writing by wire has been available almost as long as the telephone (Bretz, 1971). The message transmitted can be projected on a screen by means of an overhead projector. Hageny et al (1968) have described what happens when a tele-

writer is used:

> "The instructor sends written material to the classes by writing on a paper tape over a three-by-five-inch template with a special ball-point pen. The analog pulses generated by the movement of the pen are transmitted through telephone lines to the receivers, where ink-fed styli reproduce the original graphic data on transparent acetate. The overhead projector coupled to the receiver projects the enlarged writing into a conventional projection screen. It is also possible to produce Electro-writer combination receiver - transmitter units so that two-way written discourse would be feasible." (Hageny el al, 1968, p. 14)

The method has been used in several situations. Edelman (1968) and Stutzman & Grigsby (1973) quoted above, used telewriting in their experiments. Wecke (1970) reports on an experiment within the university extension where students on campus were compared with remote students. The remote students received a telelecture including the use of telewriting. The data collected indicated that the telelecture utilizing telewriter was as effective as on-campus teaching.

Before summarizing advantages and disadvantages of the method, we can consider telelecturing from a financial point of view. Many of the studies reported in this review have pointed to the fact that telelecturing is inexpensive. It is, however, very difficult to form an idea of the real costs of telelecturing. All depends on what expenditure is calculated. Parker (1974) states that ETN-SCA costs an average 14 cents per student-hour. But he adds:

> "This cost reflects only the network production and operation costs and not the instructional materials such as slides, printed materials, etc.". (Parker, 1974, p. 36)

It does not appear from this how many students these costs are based on but the figures are challenging. Snellman et al (1966) report that they brought by telephone a famous fashion designer to their students at a cost of US $ 21.50 per hour. Depending on how many students participated perhaps this cost per student could be figured in cents, too. Morton & Burns (1966) organized telelectures for 30 - 40 students in Industrial Education. They estimated the costs at US $ 30-40 per hour, which means US $ 1 per student hour. Clarke (1970), who taught Art by telephone to 273 students for two years, utilized 34 calls for a total cost of US $ 1.258. Distributed on cost per student hour that means 14 cents. It should be noted that none of the

reported figures includes the salaries for the teachers. Therefore these costs recorded are additional costs but must be related to the saving of any expenses that may arise from travelling expenditure for the teachers.

As far as we have seen the telelecture is as effective as a traditional classroom teaching method. The method has certain advantages as well as certain disadvantages. If we look at the disadvantages there are problems of a technical nature. Unsatisfactory knowledge of and unfamiliarity with the equipment - both from the teachers and the students - is one great problem. Bad sound reception can interfere. Another problem can be the scheduling of all classes and the teacher at the same time. But the greatest disadvantage in telelecturing is the lack of face-to-face interaction. Everywhere the method has been evaluated, both students and teachers have mentioned this as the main problem. The teacher can in a face-to-face meeting adapt his presentation to the reactions of the students not only verbal reactions but non-verbal gestures for instance. This opportunity does not exist in the telelecturing. Despite these disadvantages the evaluative studies indicate that the effectiveness of the telelecture method is as high as a traditional classroom lecture. From another point of view the method has great advantages. These have been stated very well by Parker (1973) as he summarizes the advantages of ETN-SCA:

> "It provides for truly 'continuing' education, enabling participants to receive limited amounts of information frequently ... There is great economy in time and money for the participants and the faculty. Neither is required to travel significant distances or spend significant amounts of time away from occupational or teaching responsibilities.
>
> Departments are able to reach entirely new audiences which had been neglected previously ... ETN-SCA enables us to reach isolated professionals who would otherwise be in an educational vacuum." (Parker, 1973, p. 14-15)

Parker is referring to the specific ETN-SCA services but his statement can be valid for all telelectures seen in this educational context. There is great value in reaching people for continuing education or retraining and here the telephone can be helpful. Of course television, broadcast, tapes can be used but the advantage of the telephone is the possibility of two-way communication.

Dial-access

Previously we have defined dial-access as an information service system which provides a person who dials a certain telephone number with a brief summary on different topics by means of pre-recorded tapes. Most of dial-access systems are operating in connection with libraries. Technically two solutions are available for setting up a dial-access library. The caller of a dial-access library selects the tape from a catalog previously distributed to him. Then he calls an operator who inserts the tape to a play-back machine and the caller listens. The other solution is an automatic system where each tape in the dial-access library has its own telephone number. The caller phones the dial-access library number and then the selected tape number. The operational system then selects the tape and plays it to the caller.

Most of the dial-access library systems are of the manual, non-automatic type. The first and still the biggest dial-access library was created in Wisconsin in 1966 at the Medical Center. The purpose of this library was to provide physicians with immediate access to authoritative medical information (Meyer, 1967). The doctor could call the dial-access library 24 hours-a-day and select a tape which he wanted to listen to. The tapes contain information of an emergency nature or present current recommended procedures. 200 tapes were available and each tape was 4-6 minutes in length. The topics were selected by faculty members and contained core information useful in clinical practice. During the first year of operation the library received 1.859 calls which means an average of 5 calls per day. The tapes on Pediatrics, Psychiatry, and Internal Medicine were utilized most frequently.

A similar service was in 1968 patterned for nurses in Wisconsin. The purpose and the method were the same as for the program for the physicians. (Niles, 1970). The contents of the tapes were selected by a committee which had guidelines to cover:

> "(a) nursing care in emergency situations; (b) new procedures and equipment; (c) recent developing in nursing; (d) legal aspects in nursing situations." (Niles, 1970, p. 8-9)

The cost of the service was not very high. The equipment including the

installation cost less than US $ 200 and during the first 15-month period the cost of the telephone service was US $ 10.773. During the same period the library received 16.258 calls which is an estimated cost per call of 66 cents. During the first 18 months the library accepted 20.873 calls which is 40 calls per day.

Pearson Jr (1973) has decribed all the Medical Dial Access Libraries in the U.S. The first one in Wisconsin was followed by several others, and in 1973 there were 15 operating in the country. Pearson Jr says that the collections range from 200 - 1000 tapes. He also participated in performing a study of the dial access libraries to evaluate their general value, efficiency, and effectiveness. The study was based on intensive interviews with the staff of 10 libraries. The major findings were that the different libraries handle from 2.000 up till 105.000 calls per year. (Pearson Jr & Bloch, 1974.) They found that nurses used the service twice as frequently as physicians, that 10 per cent of all calls were made in emergency situations, and that 40 per cent were related to a particular patient. About 20 to 40 % of the calls were reported by the users to result in some change in their treatment of the patient.

Pearson Jr summarizes both limitations and advantages with these medical dial-access libraries. Dial-access is limited at the moment to audiotransmission only and this is in many cases unsatisfactory. When it is possible to transmit even visual information, the biggest limitation will be eliminated. The advantage is above all that it operates 24-hour-a-day. The caller has immediate access to information. It is also a relatively cheap way to distribute new information to persons who want it, and when they want it.

The dial-access libraries have as shown been used for rapid help in critical situations but can also be seen as a method for continuing education. The method has also been used to serve students in a more conventional school. Reuter (1972) reports on a service in Denver, Colorado, where equipment for manual-served dial-access was developed. Several thousand tapes were available from a central school library. The student calls the librarian who selects the wanted audio tape and places it on a playback unit which sends the lesson over the telephone to the student. The purpose can be described when Reuter says:

"Audio tapes for the project have been purchased or developed in correlation with the necessary listening skills of the individual to: (a) improve his ability to follow directions, (b) maintain attention, (c) analyze conversation and speech, (d) listen to sounds of the language, (e) listen to the context, (f) mentally organize thoughts, (g) distinguish between relevant and irrelevant information, (h) listen for a purpose, (i) determine main ideas and important details, (j) index a message, (k) make comparisons, (l) determine normal sequence, (m) find inferences and draw conclusions, (n) sense emotions and moods and (o) enjoy critical listening." (Reuter, 1972, p. 60)

The dial-access system has - according to Reuter - generated enthusiasm among both teachers and students. Books are no longer the sole source of information. The plans are to expand the activity and also to serve adults:

"This technological development will play the role of tutor for those who may wish to follow their children's progress in the curriculum or may lack proficiency in certain basic skills." (Reuter, 1972, p. 60)

VanderWiel & Foley (1974) report on an automatic dial-access retrieval serving preschool children, elementary school children and high school students in Iowa. One purpose of the project was to reduce some educational impediments. There were external impediments such as the students' inability to reach the educational facility, e.g. students with handicap. But there were also internal impediments like the fact that all people do not learn equally well from the same communication channel. 4.000 tapes were available for children and students 14 hours a day every school day. The teachers in all grades were able to reserve tapes and telephone lines for some days. Then the students had the opportunity to call the dial-access library and take part of the material available through the library. A study of the system indicated that it was used very frequently.

Despite the more specific uses of dial-access as a service available to particular groups of professionals which has been described above, the system can probably be used with great success in educational contexts, too. As we have seen it has been used in schools with success and nothing speaks against its availability in a distande education system.

Teletutoring

The fourth form for using the telephone as an educational medium is tele-

tutoring. Previously we have defined teletutoring as a method enabling the student to get in touch by means of a telephone with his tutor to have individual support in his study work. The method differs from the others in two ways. In the first place the principal information for learning is in teletutoring given the student by other means, e.g. textbooks, correspondence courses, radio, television. Secondly the support is individual.

Some of the great multi-media systems in use have given the students the opportunity to reach their tutors by telephone. At TELEKOLLEG in Bavaria the students were able to ask questions to the television teachers by telephone on certain days. The questions were answered by the teachers direct on the television screen (Bedall, 1971). Even in Chicago TV College the students were able to reach their television teachers by telephone (Schmidbauer & Zigerell, 1971; Zigerell & Chausow, 1974). Each week a television teacher was available for two hours and a group teacher could be phoned almost every day. The students could discuss questions relating to a specific subject and the main purpose was to give the student a feeling of not being isolated. Recently a project has been introduced at the British Open University to examine one way to provide an additional support to the teaching structure (Turok et al, 1974). The problem araises from the expansion of the Open University and the fact that it has become difficult to provide some of the students with face-to-face support. The project will be started very soon and some pilot-studies have been carried out. In the project the Open University will work with conference telephones linking together several students in group-sessions.

The teletutoring has also been used as a support in family planning services. Cernada et al (1974) report from two pilot-projects in Seoul, Korea, and Taipei, Taiwan, where persons could call counselors to get information and advice in family planning matters. In these cases the main information was obtained from the telephone calls but the support was individual.

In order to provide students at a high school with individual support in studying foreign languages, Tanguay (1966) reports on an experiment with telephone instruction. The students had their lectures at school in French and Spanish as usual, but the students had the option to call a particular telephone number where they received a dialogue drill for three minutes.

Only one "lesson" was available each day. The evaluation after three months indicated that most of the students thought that the method was helpful in their work and would like to have more than one lesson each day.

In Sweden a couple of experiments using teletutoring have been carried out. Gorosch (1967) reports on a course in English for vocational teachers who were going to be on duty in developing countries. The teachers had no or insufficient knowledge in English. The training program was set up as a home study course supplemented by a one-week intensive course in Sweden and four weeks in England. The home study work was based on a self instructional textbook including tapes, some supplementary material - a sort of correspondence course - and telephone lessons with the tutor every two weeks. The telephone calls were scheduled by the tutor and contained conversation, reading, and questions from the student. Several advantages were found with these telephone lessons. The students could stay at home with their families but receive qualified support even if they lived far away. Every two weeks they could have 15-20 minutes private support from their tutors and they could work at their own pace.

Another study has been conducted by Ahlm (1972). The purpose of the study was to see how students studying by correspondence were influenced by the opportunity to discuss by telephone with their tutors. The study had an experimental design with one group of students being able to phone their tutor, and the other group having no such possibility. The subject chosen was mathematics. Since only 12 % of the students who had possibility of phoning did so, it was difficult to make conclusions. The results indicated that those students who really had used the telephone service got better results from the course than those who did not use the telephone service but had the possibility. No differences in attitudes towards the course, subject or correspondence studies in general were found between the groups. Of course, if several of the students had taken the opportunity to phone, the results could have been different.

In connection with correspondence studies the telephone has been used as a complementary aid at the National College of Adult Education in Härnösand, Sweden (Degen, 1969; Folke & Johansson, 1970). Adult students combined studying by correspondence with face-to-face instruction at the College. During the independent study period at home the students are able to get

in touch with their tutors by telephone. They can phone their tutors every minute of the day because the College has a telephone answering machine which records every call. The tutor then calls the student and the student can get individual support.

One more Swedish experiment should be mentioned. Since 1971 all pharmacies form one company with a common organization. More than 600 managers had to be trained during a short period and all were working full-time (Fernström, 1973). The training program was worked out as a home-study-program where facts were delivered by means of a pre-produced material. Exercises were worked on in groups with participants living close to each other. The participants got in touch with those conducting the training program by means of a telephone where they could discuss the exercises with the program staff. In addition the group delivered answers by means of a telecopier. The evaluation of the program is in progress.

In 1970 a project called DIAL (Direct Instruction for Adult Learning) was started in Virginia, USA, using the telephone both as an instructor and a supporting tutor. Byrd (1972) presents the program and its aims which were

> "... to benefit persons who, it was believed, normally would enroll in Adult Basic Education but who could not attend regular classes. ... one of the main deterrents to continuing education by these adults was the lack of transportation ... dependent children, invalids in the home, and work schedule in conflict with the class schedule." (Byrd, 1972, p. 122)

The first program started with programmed material available to the students and used in conjuction with telephone instruction. The student completed the material at home, mailed answers on questions to a center where it was evaluated, corrected, and returned to the student. The student could then call his teacher to get assistance, but if he did not the teacher called the student. This first part of the program was evaluated and some disadvantages were found. The students hesitated to call their teachers for assistance. Further people on a lower reading level had problems in using the programmed material.

After this first phase of the program some variations were tried. Since there had been problems for some people in using the programmed material, the instructional information was relayed to the student both live and recorded. The student could then call the center and have a lesson. As

the center had teachers on duty 13 hours a day the student could get immediate assistance. The teacher could even cut in on a line at any time, listen to what a student is working with, speak to him and ask if he needs any assistance. The development of the system indicates that there are almost unlimited possibilities in teaching by telephone. Some evaluation has been carried out comparing conventional classroom instruction and this telephone instruction. No significant differences in learning advancement were found.

IN CONCLUSION

As we have seen the telephone can be used in different ways in education. It can be used as a substitute for other instructional forms as well as a supplement to conventional instruction, such as classroom instruction, correspondence instruction. Like all other methods, it has advantages as well as disadvantages. One disadvantage is that it only uses audio transmission to deliver information. But it can be supplemented - still using the teletransmission technique - by electrowriter to give semi-visual information. Another disadvantage often emphasized is that telephone instruction seems to be impersonal but this is a disadvantage that all instructional media sustain. The only way to eliminate this impersonality is to do as we have done in our research project - use the telephone for teletutoring or arrange face-to-face instruction.

Of course these disadvantages are considerable but considering the advantages, especially for distance learners, they can almost be ignored. As Yeomans & Lindsey (1969) and Short (1974) among others, state, the advantages are first of all flexibility, which means that anywhere in the world where there is a telephone, it is possible to receive instruction. Secondly, there are low costs. Using the telephone there is a saving of money and time on the part of both the teacher and the student. Of course this applies to countries where the telephone density is high and the general costs of telephoning are low. Thirdly, using a telephone line it is possible to reach and provide remote areas with qualified instruction. In addition if the telephone is used as a complement or a supplement to other instructional media, such as correspondence courses, television, radio, it can provide the student with a private tutor ready to discuss, explain, stimulate, and motivate in the study work. In this sense the telephone is used to individualize instruction.

In this report we have pointed out four different modes of using the telephone in education. In general education all of them are practicable but in the context of our research area, correspondence material and correspondence institutes, some restrictions have to be pointed out. Teleteaching is in this least - if at all - useful. The method enables a sick or handicapped student to keep up with his class work without being physically present in the classroom. The second mode, telelecturing, can be used in combination with correspondence instructional material provided that the

distance learners are working in groups. The teacher can by using tele-lecturing give a lecture to one or several groups of students located in different sites. It is possible to reach groups of distance learners and provide them with an expert enabling the students to have a lecture by and two-way communication with the expert.

The third mode, dial-access, seems to be more useful than it has been. This is an information service system that provides a person with a brief recorded summary on different topics. The person - student - dials an operator which can be a person or a computer, asks for the specific topic and is able to listen to the message. In distance learning systems much information could be stored and made available for individual support or guidance. The fourth mode, teletutoring, will probably be the most effective and practical method in distance education utilizing correspondence instructional material. It enables the student to get in touch with his tutor by telephone to have individual support in study work. In our research project we are using this method in one of our experimental series. Students working with correspondence courses will have their usual postal two-way communication supplemented by telephone tutoring. The tutor will call the students after they have had their corrected exercises for submission returned.

In all four modes the telephone is an instructional aid which supplements other teaching methods. The uses of the telephone - as well as other electronic equipments - can be overestimated. But we agree when Ghatala & Wedemeyer (1973) say:

> "Telecommunications, properly used, can be one of the most effective tools for distant teaching and learning yet employed. Educational communications offer a unique means to provide opportunities for learning to large numbers of spatially separated learners. (Ghatala & Wedemeyer, 1973, p. 63)

They continue:

> "Appropriate application of media, technology and telecommunications to education is capable of individualizing, humanizing, personalizing and optimizing instruction and learning. As a result, the quality of education will be improved and will provide more and better education to all learners, and especially those at the little end of the horn of plenty - the distant learners." (Ghatala & Wedemeyer, 1973, p. 63)

Looking in a broader perspective it is quite obvious that distance education can be used to find a solution of what McKean (1969) was looking for:

> "There is one aspect to the lag in education which is particularly difficult to understand. We educators are largely responsible for it. The world rightfully looks to us for leadership in meeting its educational needs and we confine ourselves to the narrow limits of an ancient formula requiring the students to come to us even though we know this kind of education can reach only a very few of those who want and need to learn. We spend billions of tax dollars on 'public higher education' which serves a small fragment of the public." (McKean, 1969, p. 8-9)

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